

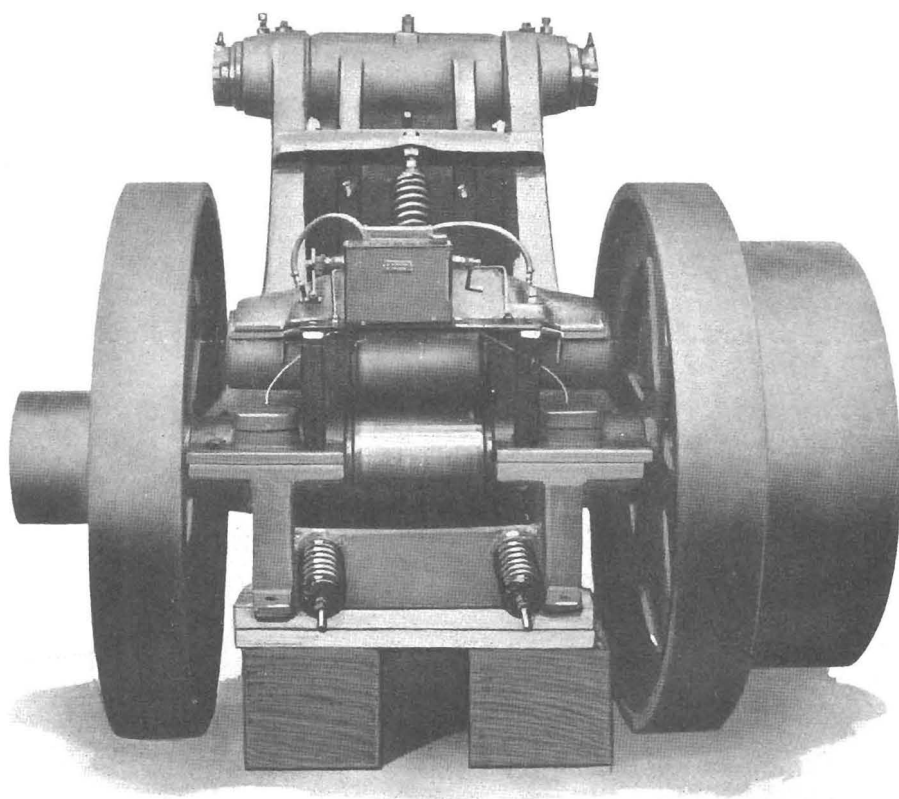
RUTLAND HISTORICAL SOCIETY

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Pine Hill Stone Crusher and Early Stone Crushing Practices In Rutland, Vermont (1887-1932)



GOOD ROADS MACHINERY CO.

"Good Roads" Climax Stone Crusher, rear view

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Pine Hill Stone Crusher and Early Stone Crushing Practices in Rutland, Vermont (1887-1932)

by Paul J. Crossman, Jr.

Early use of stone crushing equipment is documented in the Annual Reports of the Village of Rutland, 1887-1892. During that period Rutland Village contracted with Andrus B. Engrem of 148 North Main Street to remove stone from a ledge on Mr. Engrem's property and to locate a stone crusher there. (See Fig 1). An abundant supply of rock was obtained from the ledge which is still visible today. At that time, the cost to Rutland Village to remove and crush the stone was 20 cents per yard.

During 1895, West Street was resurfaced using a ten-inch layer of crushed stone over a ten-inch road bed, then rolled with a 15-ton steam roller. The result was a street that was considered "The Best in the State". The former use of cobblestones to build roads was abandoned and replaced with more cost-effective use of crushed stone.

A steam drill was used to facilitate removal of stone from the ledge. Both drill and crusher were steam-driven. In 1898 the crusher was moved 75 feet closer to the quarry to reduce noise interference with traffic on North Main Street. A new Gates rotary stone crusher was purchased that was portable and could be transported to any section of the city where stone was plentiful and could be crushed on site.

The crushed stone was used as aggregate in concrete and macadam to pave city streets in Rutland. During 1900, East, Edson and Willow Streets were paved with macadam using stone taken from the North Main Street quarry. Similarly, stone taken from a ledge on the David Guerrin property at 389 West Street (See Fig. 1) was used with macadam to pave Columbian Avenue, West and Pine Streets.

All of the stone crushed during 1903 was taken from a ledge near the east end of Terrill Street (See Fig. 1). That ledge was of lime formation, harder and more uniform in composition than the ledge on North Main Street, and therefore superior for macadam mix. By 1906 several new sidewalks were constructed using crushed stone. In 1907, West Street was resurfaced using stone taken from Terrill Street, while all other work done that year and in 1908 came from the North Main Street quarry.

The new Gates rotary portable crusher was overhauled and restored to like-new condition with a new manganese steel head and sectional linings. During 1910, all stone was taken from the North Main Street quarry, and was crushed using a newly installed drill, boiler and engine. In 1911, two crushers were operating...the portable unit on West Street and the stationary unit on North Main Street with a combined output of 12,000 tons of crushed stone for the five-month season. By 1912 the stationary and portable crushers were badly worn, and the need for a new source of stone with improved properties was recognized. Samples

taken from various ledges in the Rutland area were sent to testing laboratories for analysis. Test reports showed the samples to be inferior for use as road building materials, but acceptable for foundations or fill. All stone used in 1912 was taken from the Guerrin property on West Street.



CROSSMAN

West Street quarry on the former Guerrin property as it appears today.

In 1913 the City of Rutland Department of Public Works purchased a Climax No. 3 Stone Crusher. The cost was \$1800, with an additional \$900 for foundations and installation. The crusher weighed nearly ten tons and was operated by a 20-horsepower motor. The swinging jaw moved only a few inches but was sufficient to crush any block that would fit into the 12 by 26-inch opening at a rate of 25-35 tons per hour. The crusher frame was a high-strength one-piece ribbed steel casting. Eccentric, roll and fulcrum shafts were of high tensile strength alloy steel. Adjusting plates were used to adjust the opening between movable and stationary corrugated crushing dies, thus regulating the size of the crushed stone from one-half to three inches in diameter. (See Fig. 2).

With negotiations in progress for a new quarry site and in spite of delays, the portable crusher was placed in operation at the West Street location and produced 1586 cubic yards of crushed stone in 1913. During the 1914 season production continued at the Guerrin property on West Street. Meanwhile Department of Public Works employees were considering three or four locations where a good

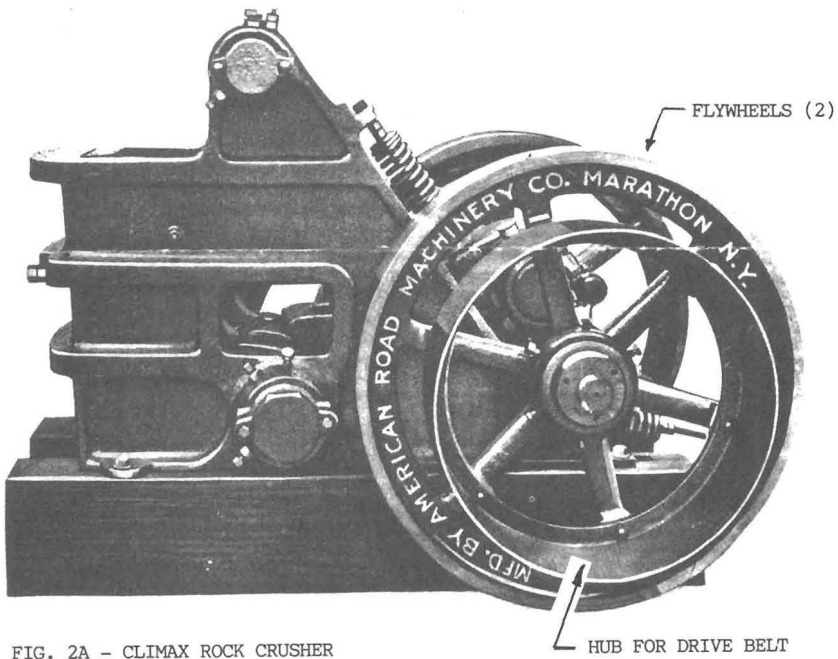


FIG. 2A - CLIMAX ROCK CRUSHER

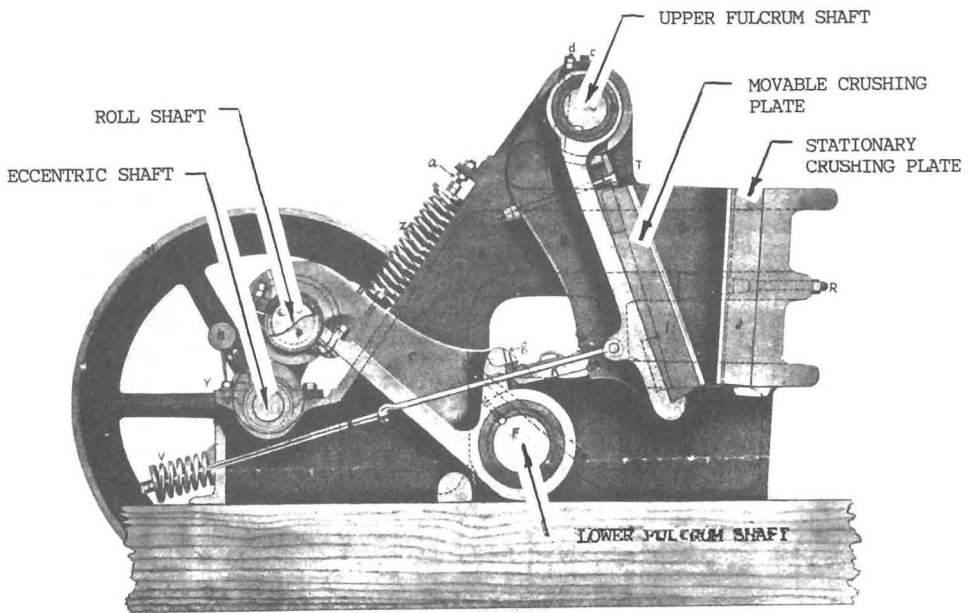


FIG. 2B - SECTIONAL VIEW OF CLIMAX CRUSHER

Fig. 2 - Side views of the Climax Crusher

quarry could be found, and where the new crusher could be permanently installed and operated at a reasonable cost. Operations at the North Main Street and West Street quarries were becoming increasingly dangerous due to traffic, heavy equipment, excessive noise and proximity to populated areas.

On 24 April 1915, the city purchased quarry rights on three acres of land near the intersection of Lincoln Avenue and North Main Street from Alonzo Gates at a cost of \$300. (See Fig. 1). Stripping of the quarry started 30 April 1915 and the new Climax stone crusher was installed. For the first time, steam-operated crusher equipment gave way to electric operation with substantial savings. One motor was used to run the crusher, and a second motor to drive an air compressor for operation of the rock drills. Two thousand tons of stone were crushed that year using the new crusher.

In the following year (1916), 6000 tons of crushed stone were produced at the new crusher plant on Lincoln Avenue. The air compressor and rock drills were rented from the Rutland Railway, Light and Power Company which also furnished the electric motors. Output nearly doubled in 1917 when 11,000 tons of stone were crushed.

On 16 July 1918, lightning struck the crusher plant on Lincoln Avenue causing a fire which destroyed one of the buildings, two motors, two belts, the air compressor and drill. Much of the damage was covered by insurance. But work start-up was delayed due to reduced labor force, increased costs and limited availability of supplies. The impact of World War I was being felt. With the crusher plant crippled, it was necessary for the city to temporarily purchase crushed stone from a quarry in Port Henry, New York.

A survey of the quarry on Lincoln Avenue showed that there was an insufficient supply of stone to finish the 1921 season. Several other quarry sites in the Rutland area were considered but found to be unsatisfactory. Finally, the quarry on Pine Hill was located on land owned by the City of Rutland and just one and three-quarters miles northwest of City Hall. (See Fig. 1 & 4). The land, known as Pine Hill Park and comprising 273 acres, was donated to the City by former Mayor H.O. Carpenter. A special Aldermanic Committee and the Commissioner of Public Works surveyed the site. After a cost estimate was made, it was decided to move the crusher plant from Lincoln Avenue to Pine Hill. Twelve horses were used during the transfer.

Samples of stone from this site were tested by the University of Vermont Testing Laboratory. Results showed the stone to be of good quality, close-grained, suitable for water-bound macadam and concrete pavement with a French Coefficient of 11.5. The stone was identified as Cambrian Quartzite, extremely solid, with excellent abrasion resistance. The old crusher on Lincoln Avenue was dismantled starting 25 October 1921. A 12-foot-wide, 2750-foot-long roadway was built from the north end of Evergreen Avenue to the new crusher site on Pine Hill, a rise of 140 feet.

In early 1922, Vermont Hydro-Electric Corporation (predecessor to Central Vermont Public Service Corporation) constructed a three-phase, 2300-volt line from the Manning Manufacturing Company, located at the corner of Park and Cleveland Avenues to the crusher location on Pine Hill. The crusher was given a general overhaul. New motors were installed. The air compressor operated at limited capacity. A large amount of stone was quarried at Pine Hill during the 1922 season.

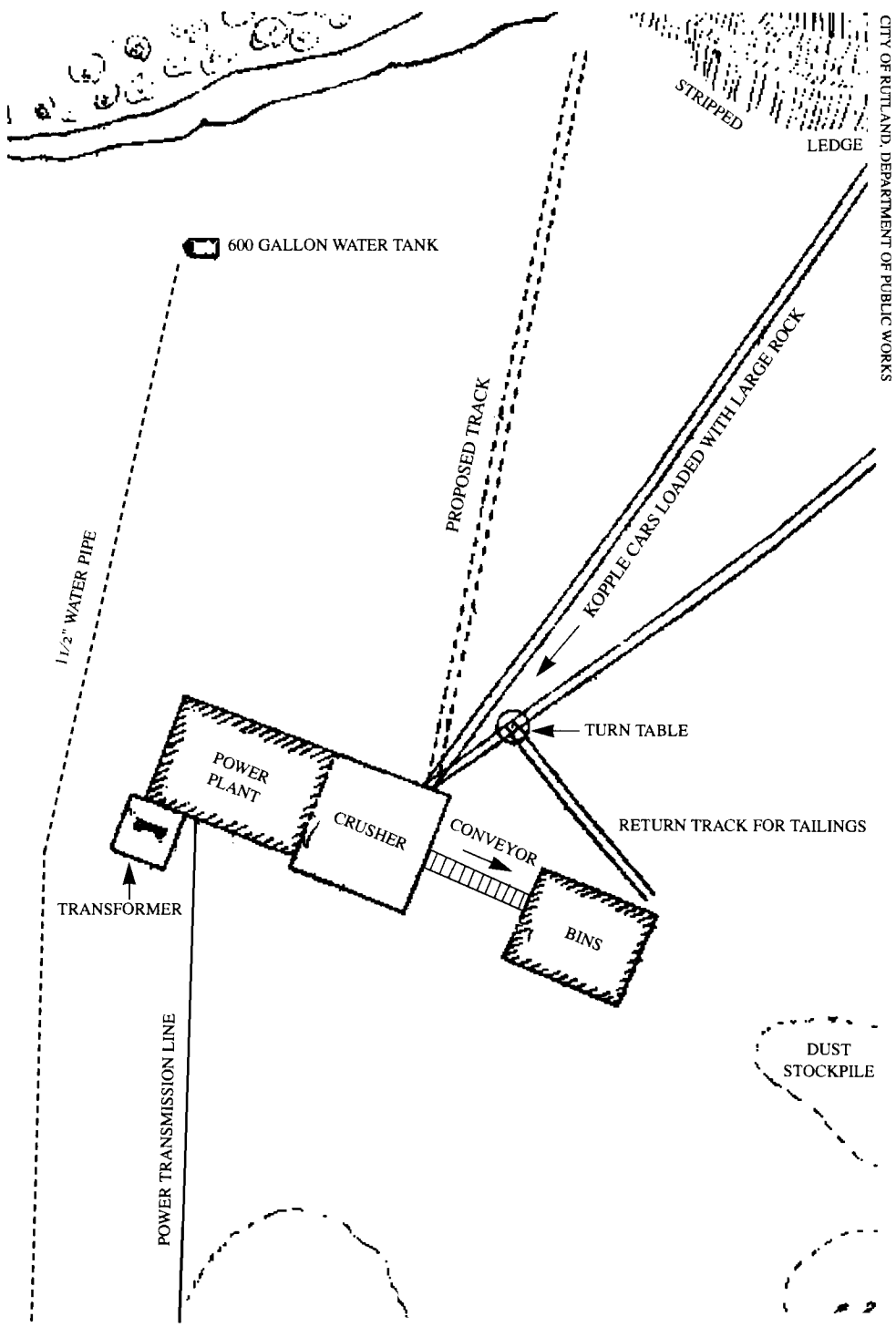


Fig. 3 - Pine Hill Stone Crusher Plant

SOON TO START STONE CRUSHER ON PINE HILL

New Plant Only Lacks Electric Power Before It Will Begin Full Operation Under City Control.

**CRUSHER'S CAPACITY IS
ABOUT 200 TONS DAILY**

Stone Will Now Be Delivered on Job At Cost of \$1.50 Per Ton Instead of \$3.00 As Formerly.

Just as soon as a little moderation in the weather will permit, electric power will be connected with the new stone crushing plant owned by the city and recently made ready for operation on Pine Hill and the city will begin to crush its own stone at a cost of half that which the city has paid for similar stone in previous years. Such stone has formerly been bought at Port Henry, N. Y., and delivered in Rutland to the city or contractor at price of \$3.00 ton and the new crusher will reduce that cost of \$1.50 per ton for stone delivered at the job.

Through the courtesy of the Public Works department, the representative of The Rutland News was taken this morning to Pine Hill to view the new stone crushing plant which has been made ready for operation. The crusher itself is, electrically driven, and has capacity of 200 tons of stone per day, while the capacity of the storage bins is 250 tons per day. The crusher is run by a 10-horse power, three phase, 60 cycle motor and weighs about 10 tons.

Old Quarry Exhausted.

Some weeks ago, the tract of land where the stone crusher now stands was generously donated to the city by H. O. Carpenter. At this time, the stone crusher was located at the city

quarry on Lincoln Boulevard. A survey of that quarry made last June showed that the supply of stone there was practically exhausted. Furthermore, the stone at the old quarry was a soft limestone with a French coefficient of hardness of from 6 to 7.

Steps were at once taken by city officials to locate a new supply without success until an investigation was made of the stone at Pine Hill. Not only was it found that there was an unlimited supply of stone on this hill, but it was found after examination at the state laboratories that it had a French coefficient of hardness of 11.5 and was declared particularly suitable for water bound macadam and concrete roads.

After an estimate of the cost was made by a committee from the board of aldermen and the commissioner of public works, it was decided to move the crusher from Lincoln Boulevard to a new location on Pine Hill. This meant a haul of practically two miles and the building of 1500 feet of new road from the end of Evergreen Avenue to the new location. This was done by city employes and in a day and a half after the crusher was removed from the old quarry it was on Pine Hill. Twelve horses were used during some parts of the trip and the crusher now stands 125 feet above Evergreen Avenue in such a place that the hauling of stone from the crusher to any part of the city

will be down grade. The crusher stands exactly one and three-fourths miles from city hall.

After the plant is put in operation which will be just as soon as the power is connected, two 1 1-2 cubic yard kopple cars will be used to bring the stone from the quarry to the crusher. There is also an automatic dump which will greatly facilitate the handling of the stone.

On the new location also stands a new power house 20 by 30 feet which was constructed by city employes.

The entire transplanting of the crusher to the Pine Hill site was accomplished at a comparatively low cost by the public works department of the city and such action will mean in the future the savings of many dollars wherever stone is used in city construction.

The stone ledge at Pine Hill was located about 90 feet west of the crusher plant. Three-quarter inch rock drills, jackhammers and dynamite were used to break away large blocks of stone from the ledge. Two V-shaped Kopple cars with one and a half cubic yard capacity, riding on 24-inch gauge tracks and loaded with raw material from the quarry, were delivered to the crusher. The large blocks were then fed into the 12 by 26-inch crusher mouth using an automatic dump system. The crushed stone was carried by conveyor to the top of nearby storage bins, graded by a rotating cylindrical screen and deposited in the bins. Crushed stone was then loaded through lever-operated chutes into trucks below and was transported to various city locations where needed. (See Fig. 3). Bituminous macadam had become the pavement material of choice. For each square yard of crushed stone, a two-gallon mix of standard Binder B Asphalt was used.

By 1923, all stone used by DPW departments was taken from the City Quarry at Pine Hill. Plant operation was satisfactory, and grade of stone quarried was of the best quality. A new compressor was installed with capacity to run two jackhammers. The crusher was overhauled using many new parts. An air hoist was purchased to operate the Kopple cars.

In 1924, all stone used by the DPW was still being crushed at the Pine Hill location. The plant was operating at a disadvantage however, due to inadequate building structures. The power house was a mere shell, removed in sections from the old quarry on Lincoln Avenue. The bins were constructed of six by six-foot spruce timber and were over-stressed and warped. A new reinforced concrete power house and storage bins were constructed during 1925 and 1926. The 25 by 52-foot power plant and stone crusher building and the 21 by 29-foot storage bins have withstood the elements for over 70 years and are still standing today. (See photograph on p. 39).

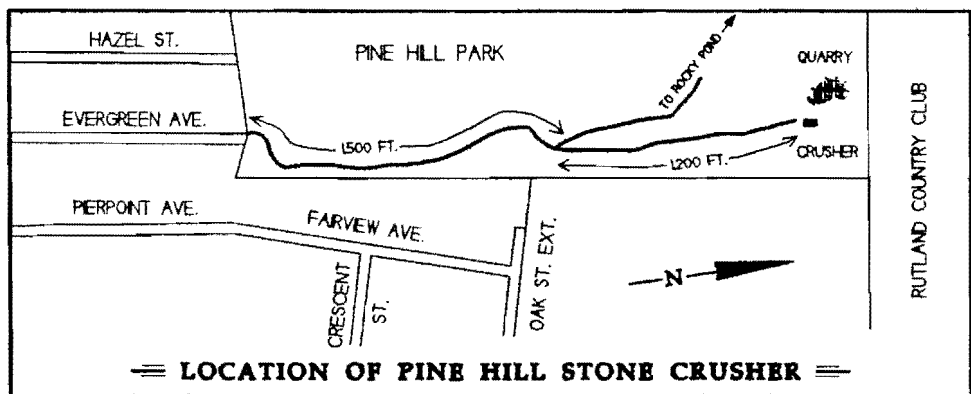


Fig. 4 - Map of Pine Hill Stone Crusher and Quarry area

Stone crushing continued until 1932 with gradually decreasing production and intermittent operation due to plant repairs and blasting restrictions. Because of citizen complaints, the amount of dynamite used in a single blast was reduced below an efficient minimum. And to accommodate golfers at the nearby Rutland Country Club, no blasting was done after 9:00 am.

The cost to produce crushed stone at Pine Hill in 1931 was approximately \$1.91 per ton. The Pine Hill crusher operated for just one month in 1932, and then shut down. The Pine Hill rock was so hard that the crusher could not meet competitive prices. Crushed stone could be purchased from other local plants much cheaper.

Present day methods of stone crushing are much like those of the early thirties. Joseph Carrara & Sons, Inc. of Rutland crushes about 2500 tons of stone per day during a nine-month season. Trap rock is taken from a quarry near Rt. 103 in Clarendon and trucked to the crusher site on Rt. 7 at Shrewsbury Road. There the rock is fed into an Allis-Chalmers Crusher with a 40 by 42-inch jaw opening and driven by a 150 horsepower motor, then to a Tellsmith Gyratory Crusher, a surge bin, a Tellsmith Screen for grading, a second Tellsmith Gyratory Crusher, washed and finally stockpiled. The end product is clean crushed stone ranging from one-eighth inch to seven-eighths inch in diameter. The stone is used by Carrara as aggregate for their ready-mixed concrete, or sold to paving contractors and individuals.

**The following is a list of men who worked at the Pine Hill
Stone Crusher in November 1931**

01	Joseph F. Bean	13 Forest St.
02	James Burke	122 1/2 Strongs Ave.
03	Alford Brown	85 Vernon St.
04	Harry Burney	120 Strongs Ave.
05	Harry Coombs	253 S. Main St.
06	H. Stanley Claw	53 E. Center St.
07	Robert Dorr	43 Union St.
08	Charles Duclaw	38 Church St.
09	Ellis Flanders	249 N. Church St. Ext.
10	Richard Fredette	34 Church St.
11	Wilbur Fredette	31 Howe St.
12	W. F. Howland	16 Evelyn St.
13	Earl F. Hier	70 Wood Ave.
14	Paul LaPine	13 Forest St.
15	Fred LaPlant	43 Grant Ave.
16	John Lancour	206 Columbian Ave.
17	Louis Martin	45 Grant Ave.
18	Jerry Musella	298 West St.
19	Fred Miles	12 Meadow St.
20	Howard Peer	124 1/2 Strongs Ave.
21	Erwin Pitts	184 Granger St.
22	Joseph G. Perry	218 Woodstock Ave.
23	Joseph E. Parent	40 Howe St.
24	Lloyd Piggram	91 Franklin St.
25	J.H. Rogers	109 Maple St.
26	Louis Sawyer	146 Library Ave.
27	Thomas Sears	44 Church St.
28	Joe Vero	54 Williams St.
29	Will Wiley	122 Strongs Ave.

Estimated payroll of stone crusher employees in 1930 was \$5000.

STONE SOURCE AND CRUSHER OUTPUT - 1887 TO 1932

<u>YEAR</u>	<u>SOURCE</u>	<u>AMT OF STONE CRUSHED</u>	<u>COMMENTS</u>
1887-1892	N. Main St.	Unknown	Steam Operated
1895	N. Main St.	Unknown	
1898	N. Main St./Portable	14800 cu yd	
1899	N. Main St.	3260 cu yd	
1900	N. Main/West St.	6955 cu yd	
1901	No Report		
1902	No Report		
1903	Terrill St.	1593 loads	
1904	No Report		
1905	No Report		
1906	No Report		
1907	N. Main/Terrill	6455 loads	
1908	N. Main St.	3018 loads	
1909	West St.	4728 loads	Rotary Crusher OH
1910	N. Main St.	Unknown	
1911	N. Main/West St.	12000 tons	05/29/11-11/04/11
1912	West St.	1147 loads	
1913	West St.	1586 cu yd	New Climax Crusher
1914	West St.	2000 tons	
1915	Lincoln Ave.	2000 tons	Electric Operated
1916	Lincoln Ave.	6000 tons	
1917	Lincoln Ave.	11000 tons	
1918	No Report		Lightning damage
1919	No Report		
1920	No Report		
1921	No Report		Lincoln Crusher Razed
1922	Pine Hill	Cap 200 tons/day	
1923	Pine Hill	Cap 200 tons/day	Oper halted 11/1/23
1924	Pine Hill	Cap 200 tons/day	
1925	Pine Hill	Cap 200 tons/day	New Pwr House & Bins
1926	Pine Hill	Cap 200 tons/day	Concrete Bldg. Comp.
1927	Pine Hill	Cap 200 tons/day	
1928	Pine Hill	Cap 200 tons/day	
1929	Pine Hill	3726 tons	04/10/29 to 12/12/29
1930	Pine Hill	3328 tons	01/13/30 to 11/29/30
1931	Pine Hill	4770 tons	05/27/31 to 12/01/31
1932	Pine Hill	347 cu yd	01/01/32 to 01/28/32
1933	Pine Hill-		Operation Ceased
1934	No Report		
1935	No Report		

INVENTORY OF EQUIPMENT AT PINE HILL STONE CRUSHER-1924

<u>QUANTITY</u>	<u>ITEM</u>	<u>VALUE</u>
1 Set	1/2" Tackle Blocks	15.00
100 Ft	1/2" Rope	5.00
20 Ft.	Extension Wire	4.00
5	Hammer Handles	2.50
1/2 Ton	Soft Coal	5.25
1	6" Iron Pulley	1.50
2	24" Levels	3.00
2	Squares	2.00
1	Line Level	.50
1	8# Striking Hammer	1.00
1	3# Hammer	.75
1	Blacksmith Hammer	.75
1	Nail Hammer	.65
6 Sets	Blacksmith Tongs	1.50
3	Sprocket Wheels	24.00
1 Box	Graphite	1.00
100	3/8" Bolts	1.00
2	Pinch Bars	2.00
1	6' Chain	1.75
1	Axe	1.00
12	Barb Hooks	2.50
1	Snow Shovel	1.00
2	Wheelbarrows	10.00
1	Battery	5.00
200 Ft.	Blasting Wire	2.00
1	Oil Drum (Empty)	1.00
28 Ft.	10" Sewer Pipe	11.20
350	Blasting Caps	24.75
1600 Lbs.	Dynamite	277.20
2500 Tons	Fine Stone	500.00
600 Tons	Coarse Stone	120.00
1	Leyner Sharpener	779.00
9	Dollies	61.75
1	Air Compressor	1060.00
4	Motors	666.86
1	Crusher-Complete	2800.00
1	Forge	15.00
1	Anvil	2.00
1	Powder House	10.00
2	Rheostats	15.00
1	Stove	5.00
400 Ton	Uncrushed Stone	400.00
876 Ft.	Track	250.00
2	Turntables	157.28
3	Kopple Cars	367.50
200 Ft.	1 1/4" Pipe	14.00
1	Water Pump	10.00
30 Ft.	Sprocket Chain #88	22.50

2	18" Jacks	8.00
92 Ft.	Belt	50.00
100 Ft.	Air Hose	15.00
1	Compressor Filter	46.53
400 Lbs.	Drill Steel	88.80
50 Ft.	Iron	7.00
9	Cold Chisels	4.50
7	Punches	.50
6	Long Handle Shovels	4.50
3	Short Handle Shovels	1.50
4	Stone Forks	2.00
7	Stone Hammers	5.25
2	Stone Hammers	2.00
200 Lbs.	Used Rails	1.00
6	Iron Bars	6.00
1	18" Monkey Wrench	1.00
1	12" Monkey Wrench	.75
1	18" Stillson Wrench	2.00
9	Open-end Wrenches	4.50
2	14" Files	.70
1 Box	Fuses	.75
14	Picks	12.06
6	Pick Handles	3.00
3 Lb.	Waste	.90
55 Gal	Oil	33.00
3 Gal	Oil for Oil Filter	2.40
6	Electric Light Bulbs	1.62
Total =		\$7969.95



*(l to r) Christine and Gerald Bianchi, Marilyn and Beverly Mayer
at the Pine Hill Stone Crusher and storage bins in 1940.*



Pine Hill Stone Crusher Plant in 1997

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About the Author

Paul J. Crossman, Jr. is a Rutland native. He received his education at Rutland High School and the University of Vermont. He retired from the General Electric Company in 1990 after 36 years of service as an Electrical Engineer. His duties included field engineering, design and test of complex surface weapons systems for the U.S. Navy. He is a licensed Professional Engineer-Electrical in Vermont. He has been a licensed Private Investigator in Vermont for four years. He also volunteers for the Vermont Department of Corrections and District Court in Rutland. His interests include the criminal justice system, court watching, historical research, forensic science, genealogy, computers, photography and traveling.

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